



# Swiss Science Concentrates

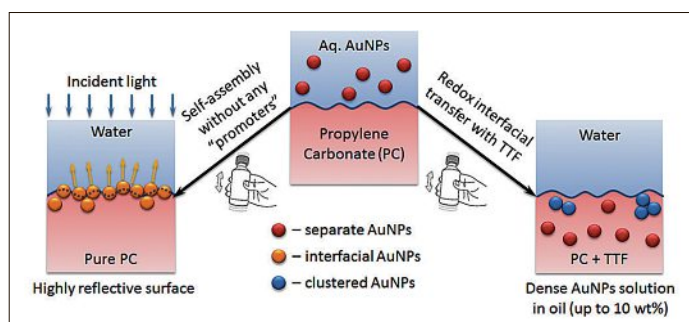
A CHIMIA Column

Short Abstracts of Interesting Recent Publications of Swiss Origin

## Self-assembly and Redox Induced Phase Transfer of Gold Nanoparticles at a Water-Propylene Carbonate Interface

E. Smirnov, P. Peljo, and H. H. Girault\*, *Chem. Commun.* **2017**, 53, 4108. EPFL Valais Wallis, Sion

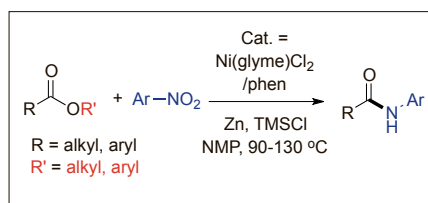
Liquid-liquid interfaces (LLIs) represent an excellent model system to study the self-assembly of various types of nanoparticles. In comparison with solid-liquid interfaces, they have a number of unique properties: flexibility, self-healing properties and a defect-free nature. Girault and coworkers now show that propylene carbonate (PC) serves as an interesting organic solvent to perform self-assembly at a LLI. Citrate-covered gold nanoparticles (AuNPs) spontaneously self-assemble into a lustrous film at a bare water-PC interface without any functionalization of AuNPs or 'promoters' due to the extremely low interfacial tension. More surprisingly, the AuNPs are transferred easily into the oil phase with the formation of a stable dense colloid, if a special molecule, such as tetrathiafulvalene, is present in the organic phase.



## Direct Amidation of Esters with Nitroarenes

C. W. Cheung, M. L. Ploeger, and X. Hu\*, *Nat. Commun.* **2017**, 8, DOI:10.1038/ncomms14878. EPF Lausanne

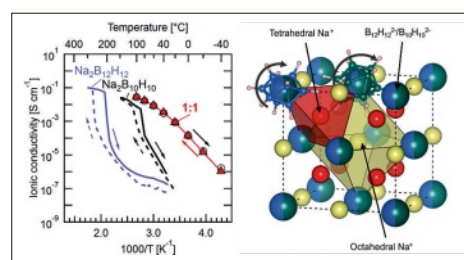
The one-step conversion of esters into other functional groups is an attractive strategy in organic synthesis. Direct amidation of esters is particularly appealing due to the omnipresence of the amide moiety in biomolecules, fine chemicals, and drug candidates. However, efficient methods for direct amidation of unactivated esters are still lacking. Hu and coworkers now report a nickel-catalyzed reductive coupling method for the direct amidation of numerous unactivated esters with nitroarenes. A wide range of amides bearing functional groups was prepared, thus demonstrating a broad substrate scope and high functional group tolerance. The method was used to expedite the syntheses of bioactive molecules and natural products, as well as their post-synthetic modifications.



## A Highly Stable Sodium Solid-State Electrolyte Based on a Dodeca/Deca-Borate Equimolar Mixture

L. Duchêne, R.-S. Kühnel, D. Rentsch, A. Remhof\*, H. Hagemann, and C. Battaglia, *Chem. Commun.* **2017**, 53, 4195. Empa, Dübendorf and University of Geneva

All-solid-state sodium-ion batteries are attractive alternatives to their lithium-ion counterparts, as they promise better performance and lower costs. A competitive all-solid-state battery, however, requires a solid-state electrolyte with high ionic conductivity near room temperature in combination with a high thermal and electrochemical stability. Fulfilling all these prerequisites poses a major challenge. Remhof and coworkers now present a new solid-state sodium electrolyte,  $\text{Na}_2(\text{B}_{12}\text{H}_{12})_{0.5}(\text{B}_{10}\text{H}_{10})_{0.5}$ , which offers high  $\text{Na}^+$  conductivity at room temperature and, at the same time, possesses excellent stability.

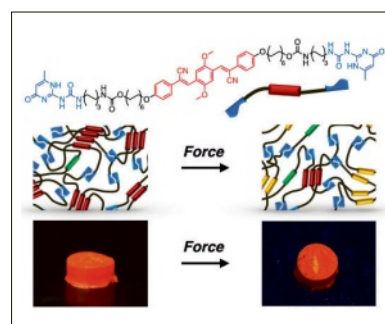


The electrolyte is compatible with a sodium metal anode enabling long-term and reversible sodium plating and stripping.

## A Mechano- and Thermoresponsive Photoluminescent Supramolecular Polymer

A. Lavrenova, D. W. R. Balkenende, Y. Sagara, S. Schrettl, Y. C. Simon, and C. Weder\*, *J. Am. Chem. Soc.* **2017**, 139, 4302. Adolphe Merkle Institute, University of Fribourg

Non-covalent interactions play a critical role in mechanoreponsive luminescent (MRL) materials, whose emission color changes upon application of external forces. Unfortunately, many dyes with MRL behavior don't display useful mechanical properties. In this paper, Weder and coworkers combine MRL compounds with the concept of supramolecular polymerization. A cyano-substituted oligo(*p*-phenylene vinylene), whose MRL behavior is associated with different solid-state assemblies, was derivatized with ureido-4-pyrimidinone groups to support the formation of a dynamic supramolecular polymer.



The new material exhibits the characteristic thermo-mechanical properties of a supramolecular polymer, offers three different emission colors in the solid state and exhibits both mechano- and thermoresponsive luminescence.